MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

ECP2056 – DATA COMMUNICATIONS AND COMPUTER NETWORKING

(TE / RE / BE)

15 MARCH 2018
9.00A.M – 11.00A.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages with 4 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1

a) Explain the appropriate transmission mode(s) used for the following:
   (i) Conversation via Intercom
   (ii) Voice call via Skype
   (iii)Radio broadcasting

[6 marks]

b) Draw a hybrid topology with a star backbone and three ring networks. Discuss the effect if a connection fails in a star backbone and ring networks.

[5 marks]

c) Technological convergence is increasingly prevalent in current information technological world. It refers to a process which telecommunications, information technology and media that are initially operated separately are then merge to operate together.
From technical point of view, discuss the following:

   (i) The importance of standard in providing converging technology.

[4 marks]

   (ii) The function of syntax, semantic and timing in ensuring the services can be works well.

[6 marks]

d) Map the following to the suitable OSI layer. Explain the function of each layer.
   (i) Process to process delivery
   (ii) Host to host delivery

[4 marks]

Continued...

Question 2

a) A network with bandwidth of 10Mbps can send an average of 12,000 frames per minute. Each frame consists of an average of 10,000 bits. Calculate the network throughput. Hence, compare throughput to the bandwidth allocated.

[3 marks]

b) Given a bandwidth of a transmission medium used is 4,000Hz (1000 to 5000 Hz).

(i) Find the carrier in each direction of transmission if transmission is in ASK full-duplex mode. Assume there is no gap between the bands in two directions.

[5 marks]

(ii) Calculate the bit rate, if the transmission is in FSK full-duplex mode. Given that the difference between the carrier frequencies is 1000Hz.

[4 marks]

(iii) Calculate baud rate and bit rate for 8-PSK half-duplex mode transmission.

[5 marks]

c) Compare asynchronous and synchronous transmission.

[4 marks]

d) Synchronous TDM is used to combine 30 digital sources, each of 100kbps.Each output slot carries 2 bits from each digital source with one extra bit is added to each frame for synchronization purpose. Calculate:

(i) The size of output frame in bits.

[1 mark]

(ii) The output frame rate

[1 mark]

(iii)The duration of an output frame

[1 mark]

(iv)The output data rate

[1 mark]

Continued...

Question 3

a) Given that in a CRC system, the data to be transmitted is 10101 and the generator polynomial is given by:

$$x^3 + x + 1$$

Generate the CRC for the data and perform CRC checker to prove that the data is intact.

[7 marks]

b) A network using CSMA/CD has a data rate of 20 Mbps. Two stations are located at both ends of a medium. The distance between the two stations is 2.5 km and the propagation speed on the medium is 1×10^8 m/s.

(i) What is the efficiency of the network for minimum frame length?

[2 marks]

(ii) Determine the minimum frame length.

[2 marks]

(iii) If the frame length is 1000 bits, find the throughput that can be attained in the network.

[4 marks]

(iv) State whether CSMA/CD is suitable to be used for Wi-Fi applications. Justify.

[5 marks]

c) Based on the Figure Q3 as shown below, determine the type of ARQ and explain the operation shown.

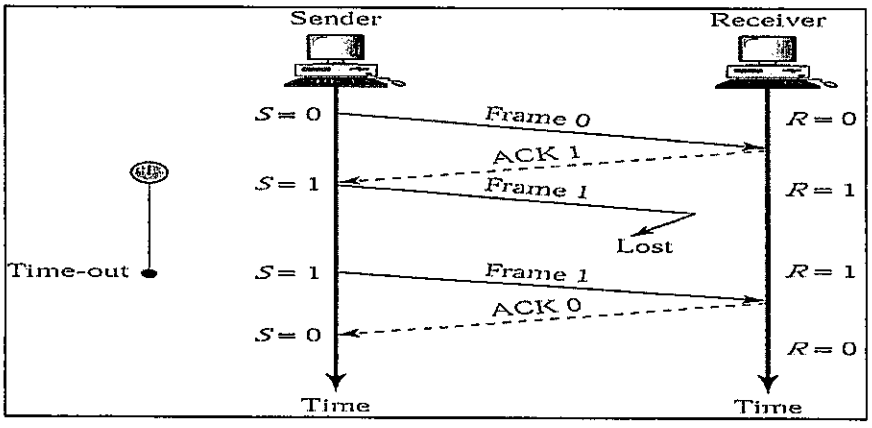

Figure Q3

[5 marks]

Continued..

Question 4

a) A Hamming coding system needs dataword, k, of at least 9 bits. What would be suitable values for checkbit, m and codeword, n that satisfy this requirement?

[6 marks]

b) You have been hired as a fresh network engineer for company A2Z. Company A2Z has a network address of 126.xxx.xxx.xxx. The management of A2Z has requested that you design the network so that it has a maximum of 62 usable subnets.

(i) State in which class does the network address for company A2Z belong to.

[1 mark]

(ii) Draw a diagram which shows the IP address format of your network address class specifying the name and length of each field in the diagram.

[3 marks]

(iii) Deduce the maximum number of hosts in each subnet.

[6 marks]

(iv) Determine which subnet mask you should assign. State your answer in both, binary representation as well as dotted decimal.

[3 marks]

c) Based on your understanding of window advertising in congestion control, analyze the following:

(i) If the receiver, host B, has a buffer size of 5120 bytes and receives unprocessed size of 1024 bytes, what would be the ideal advertised receiver window (rwnd) for host A? Why?

[3 marks]

(ii) If the value of rwnd is 3000 bytes and the value of cwnd is 2500 bytes, what is advertised window for host A? Why?

[3 marks]

End of paper